# ERGONOMICS

The international journal of research and practice
in human factors and ergonomics

# ERGONOMICS

## CONTENTS

# How the Kano model contributes to Kansei engineering in services

Markus Hartono [a] [b] & Tan Kay Chuan [a]

[a] Department of Industrial and Systems Engineering, National University of Singapore,
Singapore

[b] Department of Industrial Engineering, University of Surabaya, Indonesia

Available online: 25 Oct 2011

PLEASE SCROLL DOWN FOR ARTICLE

# How the Kano model contributes to Kansei engineering in services

Markus Hartono[a,b]* and Tan Kay Chuan[a]

[a]*Department of Industrial and Systems Engineering, National University of Singapore, Singapore;* [b]*Department of Industrial Engineering, University of Surabaya, Indonesia*

Recent studies show that products and services hold great appeal if they are attractively designed to elicit emotional feelings from customers. Kansei engineering (KE) has good potential to provide a competitive advantage to those able to read and translate customer affect and emotion in actual product and services. This study introduces an integrative framework of the Kano model and KE, applied to services. The Kano model was used and inserted into KE to exhibit the relationship between service attribute performance and customer emotional response. Essentially, the Kano model categorises service attribute quality into three major groups (must-be [M], one-dimensional [O] and attractive [A]). The findings of a case study that involved 100 tourists who stayed in luxury 4- and 5-star hotels are presented. As a practical matter, this research provides insight on which service attributes deserve more attention with regard to their significant impact on customer emotional needs.

**Statement of Relevance:** Apart from cognitive evaluation, emotions and hedonism play a big role in service encounters. Through a focus on delighting qualities of service attributes, this research enables service providers and managers to establish the extent to which they prioritise their improvement efforts and to always satisfy their customer emotions beyond expectation.

**Keywords:** Kansei engineering; emotional feelings; Kano model; services

## 1. Introduction

Humans exhibit strong interest in products through emotion. Despite emotion being highly subjective and individualistic, Desmet (2008) was able to identify the relationship between product elements and customer expression. Products advantageous to consumers evoke pleasant emotions. As products or services are of equivalent quality in the market place, a subjective evaluation of aesthetics becomes a critical precursor to customer satisfaction. Apart from cognitive evaluation, emotions also play a big role in product interaction and service encounters.

Today's customers are highly dynamic and quite demanding. They tend to be disloyal to particular products and services. Compared with their first launch, the sales of many products tend to decrease over time. This situation forces companies to reconsider their product design and development strategies (Shimizu *et al.* 2004). Companies must listen closely and carefully to the voices of their customers, especially their latent needs. Latent needs are the unspoken emotional needs that customers seek in products and services.

The development of products involving customer emotional needs was initially proposed by Nagamachi (1995). Nagamachi introduced Kansei engineering (KE) as a powerful product development method, which takes into account the customer emotional needs (Kansei in Japanese). This method has been successfully adopted by Mazda Motor Corporation for developing their Miyata model (MX5 in Europe). It symbolised 'Human–Machine Unity' (*Jinba-Ittai* in Japanese) (Nagamachi 1995). The eminence of this method lies in its abilities to quantify customers' Kansei needs and to build a quantitative relationship between these emotional needs and the design features of a product.

In many cases, the voice of customer is an important component for new product/service development and the innovation process. A great deal of resources (working hours, methods and tools) is involved during the complex process. Since a few decades ago, the focus of business management and research has been intensively on customer satisfaction. In today's competitive business environment, however, to satisfy customers is not sufficient. Rather, how to delight our customers has become a prominent issue for long-term business success (Yang 2011). Hence, companies must intensively strive for total customer satisfaction and loyalty to win over the competition (Schneider and Bowen 1999). In other words, there

*Corresponding author. Email: markushartono@nus.edu.sg

would be a competitive advantage for a company, which always focuses on desired attributes with the fulfilment of unexpected and memorable experiences to customers (Yang 2011).

The question is asked, 'What design features really do have great impact on customer emotional needs and evoke a great deal of delight?' Logically, customer impression is positively, linearly related to improved product or service features. However, in some cases, the relationship between product quality and customer impression is no longer linear (Kano et al. 1984, Chen and Chuang 2008). As a consequence, continuous or even radical improvement on certain product or service attributes without intensively considering what customers desire, might not be sufficient. Contrast this to a situation where only a little innovation might lead to a large amount of customer delight. The Kano model has the potential to eke out unspoken or latent human needs, the satisfaction of which might lead to customer delight. Delighted customers will remain loyal and refer favourably to others about the company and its services or products.

According to Kano et al. (1984), the Kano model provides the categorisation of customer needs into three major groups (i.e. must-be [M], one-dimensional [O] and attractive [A]). A brief explanation of each of these groups is discussed in section 2.1. This model provides a unique way of distinguishing the impact of different customer needs (voice of customer) on total customer satisfaction in the early stage of product/ service development (Rahardjo 2007). In highly competitive market place, companies need to create and offer product/service attributes targeted specifically at exciting customers and over-satisfying them (Tan and Pawitra 2001). Not only does the Kano model promotes understanding of product/service requirements, but also provides valuable guidance in trade-off situation due to technical and financial reasons (Matzler and Hinterhuber 1998). In this situation, the attractive attributes should be treated carefully as they are the key to beating the competition in the market place (Tan and Pawitra 2001).

The Kano model has shown its contribution to quality fields such as integrating it with quality function deployment (QFD) (Tan and Pawitra 2001), the dynamics of Kano in design for six sigma (Rahardjo 2007) and the role of Kano's model in robust design (Chen and Chuang 2008). In line with developments of the Kano model, KE has also a strong ability to integrate with other statistical and quality tools (Schütte 2002). A recent study by Lanzotti and Tarantino (2008) addressed the issue of KE and other methods in the field of quality design.

There is no formal methodology, however, to investigate the contribution of the Kano model on

KE. Therefore, to fill in this niche, this study proposes two objectives. The first is to develop an integrative framework of the Kano model and KE in services. This research will show the applicability of modified KE in services, apart from products. The second objective is to conduct a preliminary test of this proposed framework by taking a case study on luxury hotel services in Singapore and Indonesia. The Kano model is incorporated into the KE methodology as an enhancement tool that can determine the performance level of service attributes. Specifically, the proposed integrative framework will provide insights to service designers to not only be able to classify the service attributes, but also to prioritise the improvement of service attributes taking into account the impact on customer emotional needs/ Kansei.

This article is organised as follows. Following the introduction, a short literature review of the Kano model and KE is presented. Thereafter, a proposed integrative framework of the Kano model and KE as the key contributions of this article is presented. In order to provide practical insight, an empirical study on luxury hotel services is provided in the next section. Then comes the discussion and implications sections.

## 2. Literature review
### 2.1. The Kano model and its potential benefits
Inherently, the Kano model categorises customer attributes into three different types, namely, must-be (M), one-dimensional (O) and attractive (A). A must-be (M) or basic attribute is related to something taken for granted and not mentioned explicitly by customers. The absence will cause significant dissatisfaction while the existence will not give any significant impression. A provision of toilet papers in hotel restroom is a common example. Late availability of them brings complaints from customers. A one-dimensional (O) attribute shows the linearity relationship between customer satisfaction and performance of the attribute. The better the performance, the higher the level of customer satisfaction is. For instance, a faster hotel check-in process results in higher customer satisfaction. While the attractive (A) attribute, known as delighter, is beyond customer expectation. A little fulfilment on it brings a great deal of satisfaction. Free wireless internet access in a hotel is an example of this attribute. Figure 1 shows the visualisation of these three categories.

Five approaches are valid and reliable in categorising product/service attributes in the Kano model (Mikulić and Prebežac 2011) such as 'Kano's questionnaire', 'penalty-reward contrast analysis', 'importance grid', 'qualitative data methods' and
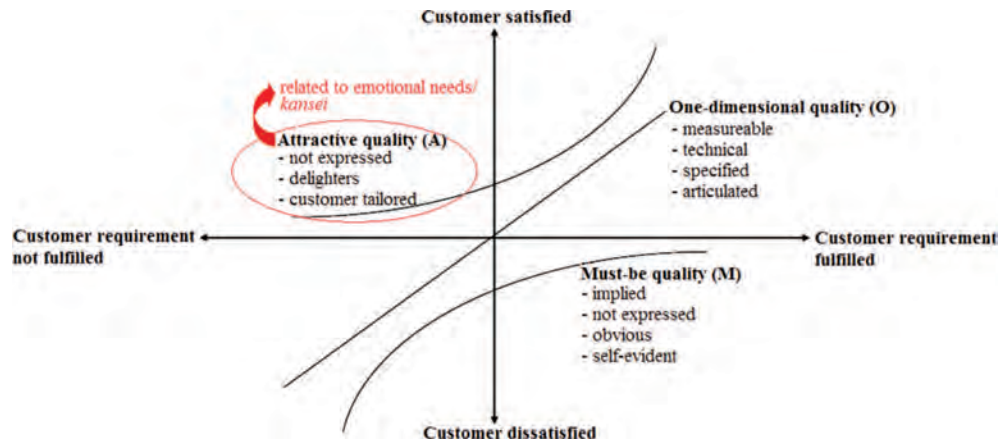
Figure 1. Where Kansei potentially affected by Kano quality categorisation is, modified from Berger *et al.* (1993).

'direct classification'. According to their findings, only the Kano's questionnaire and the direct classification methods are capable of classifying Kano attributes in the product/service development phase.

Inherently, the Kano model is similar to the Herzberg's motivation-hygiene theory inspired by the Maslow's theory of a need hierarchy (Maslow 1943). The characteristic of Kano's and Herzberg's models is that a reminder that in working to satisfy customers, it is highly required to minimise customer dissatisfaction. According to a study by Herzberg (1968) which involved 1685 employees, there have been two major classifications of employee satisfaction generator. They were (i) motivator (satisfier) which refers to achievement, recognition, work itself, responsibility, advancement and growth; and (ii) hygiene factor (dissatisfaction-avoidance) that concerns company policy, supervision, relationship with boss, work conditions, salary and relationship with peers. Job characteristics related to motivator factors will lead to employee satisfaction and happiness. However, similar to Kano's attractive category, the absence of such gratifying jobs will not appear to lead to dissatisfaction. Instead, the unfavourable assessments of jobs concerning the hygiene factor will cause dissatisfaction. Clearly, the improved hygiene factors will not lead to any significant increase in employee satisfaction. Thus, a company should promote self-enhancement jobs rather than administration-related jobs in order to achieve a high level of employee satisfaction.

The Kano model concerns quality for customer, whereas Herzberg focuses more on the relationship between the employer and the employees within an organisation. Kano named the Herzberg's motivation-hygiene theory as the quality's M-H theory and redefined it as attractive and must-be qualities (Lee

and Chen 2006). Basically, Kano has three main satisfaction drivers (attractive [A], must-be [M] and one-dimensional [O]), whereas Herzberg has two main satisfaction drivers (hygiene and motivator). Kano typically completed the Herzberg model by incorporating a diagonal line moving from southwest to northeast that refers to linearity of satisfaction level (known as one-dimensional). In general, the Kano model provides a formal methodology as a unique way of distinguishing the impact of different customer needs (i.e. the voice of customer) on total customer satisfaction in the very early stage of product/service development. Moreover, this method has been incorporated into an existing quality tool (such as QFD) in fitting accurate customer needs (Tan and Pawitra 2001). This refined Kano method has a wider scope than Herzberg's model, since it has been applied intensively and widely in products and services (see, Shen *et al.* 2000, Tan and Pawitra 2001). According to Wittel and Fundin (2005), the Kano model is potentially used to determine the dynamics of customer needs. Rahardjo (2007) proposed a study to quantitatively model the limited historical data, which are derived from the results of Kano questionnaires, in order to forecast the future Kano's category for each of the quality attributes.

In identifying which Kano category a particular service attribute falls under, the Kano questionnaire is used (Kano *et al.* 1984). A subject is faced with two Kano situations. The first is where the quality of the service attribute is present or functional. The second situation is where the quality of the service attribute is absent or insufficient or dysfunctional. In either situation, the subject must choose one of the responses as shown in Table 1 to express his feeling of satisfaction (Kano *et al.* 1984, Chen and Chuang

Table 1. Kano evaluation table.

| | | | Dysfunctional | | | |
|---|---|---|---|---|---|---|
| Service criteria/attributes | | Satisfied | It should be that way | I am indifferent | I can live with it | Dissatisfied |
| Functional | Satisfied | Q | A | A | A | O |
| | It should be that way | R | I | I | I | M |
| | I am indifferent | R | I | I | I | M |
| | I can live with it | R | I | I | I | M |
| | Dissatisfied | R | R | R | R | Q |

Notes: A, attractive; O, one-dimensional; M, must-be; I, indifferent; R, reverse; Q, questionable.

2008). By integrating these two responses, the service attribute criterion can be identified as attractive (A), must-be (M) or one-dimensional (O).

There are two potential benefits of incorporating the Kano model into product or service development. First, it gives a better understanding of customer requirements as classified into several categories (A, O, M or I). Second, it can be used as a prioritisation tool if a trade-off needs to be made. If the improvement of certain product or service attributes cannot be effected (due to, for example, financial, technical or operational reasons), the attributes in the higher categories (e.g. attractive qualification [A]) would be given higher priority. As argued by Matzler and Hinterhuber (1998), it is not very beneficial to invest in improving must-be qualifications (M), which have already attained a satisfactory outcome.

## 2.2. Kansei engineering

The trend of the 21st century is in hedonism, pleasure and individuality. Such notions stimulate customers to shift their focus on hedonic ergonomics in product design rather than functionality (Helander 2003). KE has a strong ability to deal with such trends and to accommodate customer emotional needs/Kansei (Nagamachi and Imada 1995).

KE has been considered superior to other similar methods. It has the ability to translate customer emotional needs into concrete design parameters through engineering (Nagamachi 2002, Schütte *et al.* 2004, Nagamachi *et al.* 2009). As a consequence, it can minimise the subjective interpretation of emotions/Kansei. Also, this method is able to modify and optimise product properties which are not directly visible, such as the atmosphere of a concert hall or the comfort of a hospital (Schütte *et al.* 2008). In addition, there has been some success in integrating KE with QFD (Schütte *et al.* 2004). Llinares and Page (2011) highlight KE as an appropriate framework for linking the user perceptions expressed in words to symbolic attributes.

## 2.3. Kansei engineering in services

Traditional approaches of KE focus only on designing products that generate significant impact on customer emotional needs. In complex circumstances, customers experience both mixed physical and non-physical objects. For instance in a restaurant, customer emotions may be influenced not only by the cleanliness of meals and other physical/tangible stuffs, but also by the friendliness of staffs, accuracy of bills and prompt service. KE has to be capable of conducting examination of both products and services in a single study (Schütte *et al.* 2004).

Service attributes are the causal agents for affective responses/emotions/Kansei. Emotions have been shown to play a pertinent role in many service contexts (Laros and Steenkamp 2005) such as advertisement (Derbaix 1995), customer satisfaction (Philips and Baumgartner 2002), complaint handling (Stephens and Gwinner 1998), service failure (Zeelenberg and Pieters 1999), product attitudes (Dube *et al.* 2003) and loyalty (Barsky and Nash 2002). A mixture of physical, social and psychological emotions may contribute to service experiences (Tiger 1992, Desmet 2008). Laros and Steenkamp (2005) classified consumer emotions in services into three hierarchies, namely: super (both negative and positive affects); basic (e.g. anger, fear and contentment) and subordinate (e.g. angry, scared and optimistic).

Essentially, there are two kinds of service attributes (i.e. physical and non-physical attributes). What constitutes the physical part may be referred to as 'servicescape' (Bitner 1992) or the 'Tangible' dimension of the service quality (SERVQUAL) model (Parasuraman *et al.* 1988). Lin (2004) classified this into several parts, such as visual cues (e.g. colour, lighting and layout), auditory cues (e.g. musical and non-musical sounds) and olfactory cues (e.g. scents, ambient odours). Regarding non-physical attributes, this includes the application of specialised competencies (knowledge and skills) through processes, activities and interaction (Lovelock 1991, Vargo and Lusch 2004).

### 3. Proposed integrative framework of the Kano model and KE

The idea of integrating Kano's model and KE was first investigated by Lanzotti and Tarantino (2008) who took the case study of designing the interior of a train. Their study looked at the quality of product features. A recent study by Llinares and Page (2011) revealed the uses of the Kano model in analysing the impact of emotional attributes on customer purchase decision. Another similar study on investigating customer delight for quality attributes was conducted by Yang (2011). Her study developed a critical delight-driver model known as the customer-delight barometer (CDB). There is little research, however, that analysed the relationship between the category of product performance and customer emotional needs/Kansei.

This study proposes an integrative framework to explain the impact of service attributes categorised as attractive quality (A) on customer emotional needs in services. The motivation of this idea includes: (i) it will create little damage if there is any discrepancy, (ii) it will bring sources of differentiation where this performs well, (iii) potentially, it will drive customer loyalty and 'Wow' instead of eliminate problems and (iv) it will obtain total customer satisfaction (Yang 2011). According to Collins and Porras (2004), it is essential to invest in proactive and generative markets which are reflected by customer delight. Due to today's complexity, it is worth noting that to invest potential resources (e.g. financial and technical constraints) in a proportional way is to create the best event possible (Senge 2006).

The framework consists of four phases, and is inspired by the work of Schütte *et al.* (2004).

### 3.1. Initial phase

The first phase is to identify a service area/domain in which emotions and customer satisfaction play a large role. One would then need to identify the target group of users to survey.

### 3.2. Span the semantic space

Spanning the semantic space is also known as affective processing. This consists of three activities. The first is the collection of Kansei words. Due to the complexity of emotions interpretation, this study uses the evaluation of words (spoken) as the sources of emotional impact on the human mind (i.e. Kansei words). Words can describe emotions evoked by products or services (Desmet 2003). Kansei words can be collected through magazines, pertinent literature, manuals, experts, experienced users and ideas. The second activity is the selection/structure of the Kansei words. The purpose is

to find high level Kansei words (the main category of Kansei words) that represent the service domain in question. This step can be done either manually (using, for example, affinity diagram and interview) or statistically (using, for example, factor analysis). The third activity is the measurement of the importance and response of Kansei words. This may be accomplished by using a 5-point Semantic Differential (SD) Scale as proposed by Osgood *et al.* (1957).

### 3.3. Span the service attribute space and the Kano model application

Spanning the service attribute space is also known as cognitive processing. Three activities are involved here. The first is the collection of service attributes through technical documents, comparison of competing services, pertinent literature, experienced users, related Kansei studies, concept studies, analysis of the usage of existing services and related service groups (Schütte *et al.* 2008). A frequency analysis or Pareto diagram can be used to obtain the most relevant service attributes. The second activity is the evaluation of current service quality that includes the measurement of importance, expectation, perception and gap of the service attributes. In the third activity, the Kano model is inserted. This is in order to give a better understanding of service attribute performance. The Kano questionnaire is used to classify each service attribute as attractive, one-dimensional, must-be, indifferent, questionable or reverse.

### 3.4. Modelling and analysis

At this stage, the semantic space is linked with the service attributes space. The selected Kansei words and the attractive service attributes (A) are met and linked together. This is facilitated by multiple linear regression (Schütte 2002) or ordinal logistic regression (Lanzotti and Tarantino 2008). Afterwards, it proceeds to the analysis stage by engaging the significant models only.

Analysis is first done by checking for negative service gaps (i.e. a negative difference between perceived and expected service quality mean-values). For each negative gap, it is then checked whether the number of affected Kansei words among significant service attributes is the same. If it is the same, then the action is to choose service attributes with the most negative service gap as the first priority for improvement. Otherwise, we choose service attributes with the higher number of Kansei words. Following similar steps, if the gap is positive, then it also checks whether the number of Kansei words among significant service attributes is the same. If it is the

same, the next step is to choose service attributes with the lower gap as the first priority for enhancement/ maintenance; otherwise, we choose those with the higher number of Kansei words. A graphical representation of the proposed research model is provided in Figure 2.

## 4. Empirical study: a case in luxury hotel services

### 4.1. Selection of service domain

A luxury hotel type was chosen as the service domain. Services in hotel are very complex involving many

customer activities. In a hotel, people can perform all their activities and needs throughout the day.

The survey was conducted in luxury 4- and 5-star hotels in Singapore and Indonesia. Luxury hotels have relatively complete services which affect all the human senses. According to a study by Barsky and Nash (2002), luxury hotels were reported to have greater strength of emotion than any other hotel segment. In other words, they are able to give 'wow' factors to customers. This is in line with KE concept that all the human senses should be experienced (Nagamachi 2002). For example, when entering a hotel's lobby
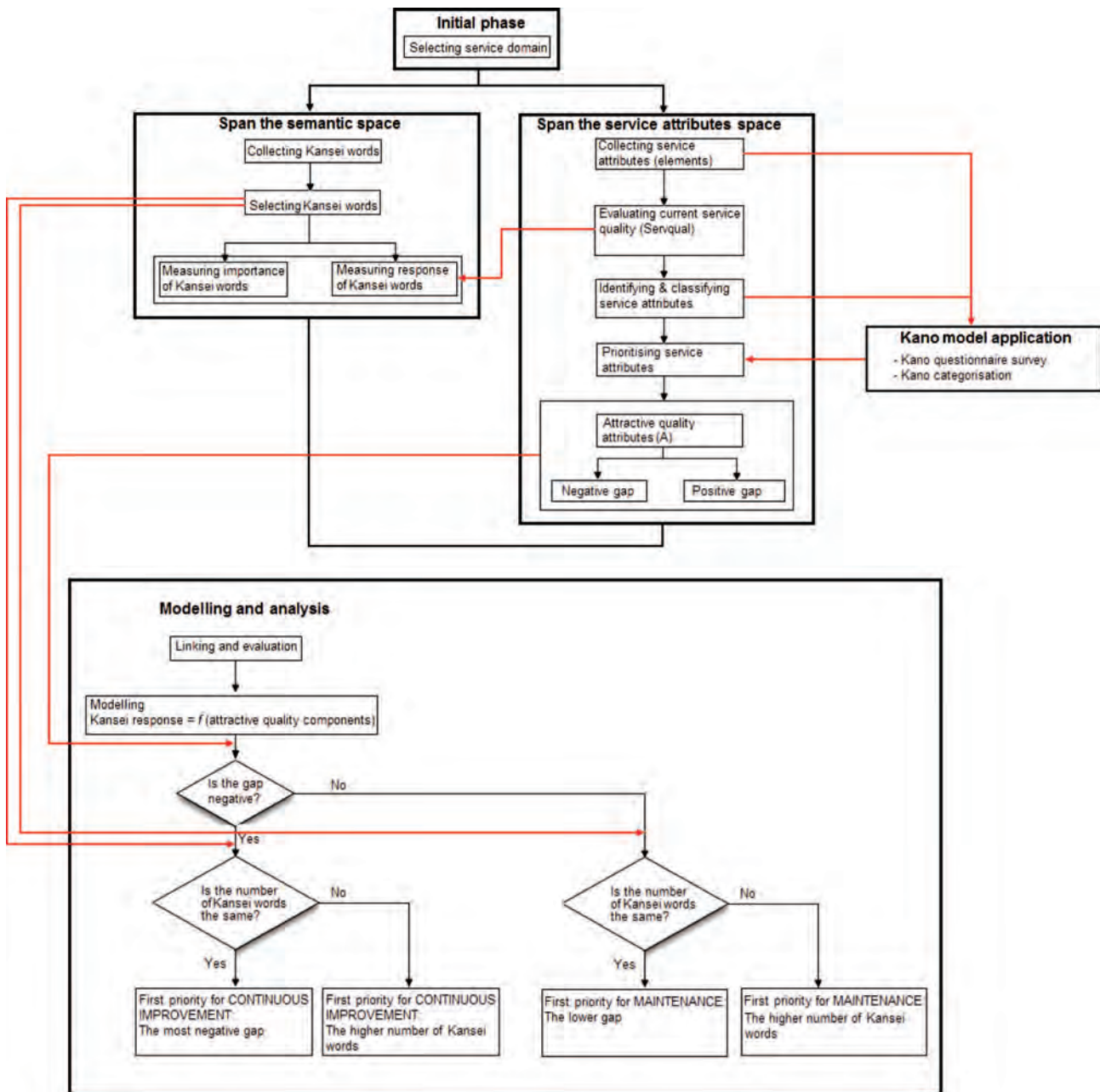


Figure 2. A proposed integrative framework of the Kano model and KE in services.

and doing a check-in process, customers' hearing and vision are the relevant sensory systems. Furthermore, taste and smell are used to evaluate the quality of meals provided in hotel's restaurants.

### 4.2. Collection and selection of Kansei words

At the initial stage, a short interview with potential subjects was conducted. The number of participants for an interview session depends on the purpose of the study. In common studies, the number of interviews is usually around $15 \pm 10$ (Steinar 2007). The Kansei words were collected from interviews with seven tourists who stayed in luxury hotels. By adopting the concept of 'contextual inquiry', on-site interviews were carried out (i.e. at a place nearby the hotels where the tourists stayed), since this allows for a valuable customer touch opportunity. One example of an interview response was '... excellent stay, hotel is a little old but it is well maintained. The environment and surrounding are cozy. It is just a walking distance to the shopping downtown Orchard road, and it has an excellent Chinese restaurant ...'. From the statement, the Kansei words captured were excellent, cozy, and convenient. Inherently, interview is one of the ways to collect Kansei words. The result is a list of 40 Kansei words that describe the emotional engagement between customers and hotel services. In order to obtain more manageable and relevant Kansei words, these words were reduced to 16 by using affinity diagrams. The final result was a set of refined Kansei words attached to the questionnaire.

### 4.3. Subjects

One hundred Indonesian tourists participated in this study. Those who stayed in luxury hotels for at least two days were targeted. A face-to-face questionnaire was used. The interviewer explained the study objective and some unfamiliar terminology, and answered any relevant queries from the participants. They were asked for their responses based on questions in the paper survey, and these were recorded by the interviewer. This process took around 20 min per subject.

The gender split was 51% males and 49% females, while the hotel category composition was 41% 4-star and 59% 5-star. The average age was at a range of 31–40 years. Their household monthly incomes ranged from less than US$2000 (35 of the sample) to over US$4000 (12% of the sample). The most frequently encountered income range was US$2001 to US$3000 (36% of the sample). Regarding the frequency of travel, over 30% of the participants travelled once every six months. The most frequent purpose for the

stay at the hotel was for vacation (43% of respondents) with less than or equal to three days for the majority of the respondents (38% of the sample). In terms of the highest education level, 39% of the respondents indicated that they were college or university degree holders. Most of them were entrepreneur/self-employed (32% of the sample). The details of the respondent profile are shown in Table 2.

### 4.4. Measurement of Kansei response and importance

Kansei responses and importances were collected using a five-point Likert semantic differential scale (Osgood *et al.* 1957). Participants were asked to rate the importance of the emotional needs/Kansei of hotel services using the same scale (1 = 'not at all important' and 5 = 'absolutely important'). In addition, with respect to experience in hotel services, they were asked to rate the fulfilment (response) of emotional needs/ Kansei on the same scale (1 = 'absolutely to negative Kansei' and 5 = 'absolutely to positive Kansei').

In order to reduce the bias/misinterpretation influenced potentially by a language barrier, graphical emoticons representing each Kansei word were attached to the survey form. An emoticon is a graphical icon that expresses emotion and is language-independent. It can eliminate some difficulties in expressing emotions using words. Thus, this tool is a valuable addition to the communication process (Huang *et al.* 2008). Emoticons convey voice inflections, facial expressions and bodily gestures without any language distraction. According to Huang *et al.* (2008), the use of emoticons also correlates with direct personal interaction (i.e. it allows people to express their emotions easily, freely and quickly) and indirect information richness (i.e. an ability to carry information and, thus, change a user's perception). This study utilised emoticons adopted from Yahoo! Messenger$^{®}$ as mentioned in the study by Huang *et al.* (2008), MSN messenger (Windows Live$^{TM}$ Messenger), and also internet browsing. The emoticons as shown in Figure 3 only covered 11 out of 16 Kansei words due to their appropriateness of expression.

The 16 Kansei words used were: 'convenience', 'attractiveness', 'cleanliness', 'welcomeness', 'confidence', 'happiness', 'relaxedness', 'peacefulness', 'passion', 'satisfaction', 'spaciousness', 'elegance', 'friendliness', 'modernization', 'relief' and 'quietness'.

Related to the 'importance' criterion, 'friendliness' had the highest mean score ($\bar{x} = 4.36$), whereas 'elegance' had the lowest mean score ($\bar{x} = 4.04$). Since all Kansei words had importance scores above 4, all were assumed to be equally important. For the 'response' criterion, 'welcomeness' had the highest mean score ($\bar{x} = 3.06$; $s = 1.33$), whereas

Table 2. Profile of respondents.

| Variables | Frequency | Percentage of total | Variables | Frequency | Percentage of total |
|---|---|---|---|---|---|
| *Hotel category* | | | *Monthly income* | | |
| 4-star hotel | 41 | 41 | <=US$2000 | 35 | 35 |
| 5-star hotel | 59 | 59 | US$2001–3000 | 36 | 36 |
| | | | US$3001–4000 | 17 | 17 |
| | | | >US$4000 | 12 | 12 |
| *Gender* | | | | | |
| Male | 51 | 51 | | | |
| Female | 49 | 49 | *Frequency of stay in 2008–2009* | 15 | 15 |
| | | | Less than once a year | 22 | 22 |
| *Age* | 3 | 3 | Once a year | 22 | 22 |
| ≤20 | 29 | 29 | Twice a year | 24 | 24 |
| 21–30 | 30 | 30 | Three times a year | 13 | 13 |
| 31–40 | 28 | 28 | Four times a year | 4 | 4 |
| 41–50 | 10 | 10 | Five times or more a year | | |
| >50 | | | | 6 | 6 |
| | | | *Highest education* | | |
| *Frequency of travel* | | | Junior high or equivalent | | |
| Once a year or less | 27 | 27 | High school or equivalent | 40 | 40 |
| Every six months | 31 | 31 | College or university degree | 39 | 39 |
| Every three months | 25 | 25 | Post graduate degree | 15 | 15 |
| Every month | 9 | 9 | | | |
| ≥Once a month | 8 | 8 | *Occupation* | 4 | 4 |
| | | | Clerical/office | 6 | 6 |
| *Purpose* | | | Engineering | | |
| Vacation | 43 | 43 | Entrepreneur/self employed | 32 | 32 |
| Business trip | 26 | 26 | Management | 10 | 10 |
| Conference | 19 | 19 | Education | 13 | 13 |
| Social visit | 12 | 12 | Finance | 18 | 18 |
| | | | Marketing | 14 | 14 |
| *Amount of time spent* | 38 | 38 | Student | 3 | 3 |
| ≤3 | | | | | |
| 4–7 | 34 | 34 | | | |
| 8–11 | 28 | 28 | | | |

'peacefulness' had the lowest ($\bar{x} = 2.06$; $s = 1.43$). The descriptive statistics of the Kansei word are reported in Table 3.

### 4.5. Collection and evaluation of service attributes incorporated into the Kano model

In being connected with customer emotional needs/ Kansei, common service attributes in luxury hotels were collected. The proposed service attributes referred to the SERVQUAL model developed by Parasuraman *et al*. (1988) with some modifications for use in luxury hotels. The modifications considered some sources of relevant information (such as web pages, hotel brochures and related studies in journals or articles). In total, there were 39 service items categorised into five dimensions: (1) tangibles (consisting of fourteen items, such as 'the receptionist and information desk is visually appealing'); (2) reliability (consisting of eight items, such as 'your hotel reservation is handled efficiently and effectively'); (3) responsiveness (consisting of five items, such as 'the employees tell you exactly when services will be performed'); (4) assurance (consisting of six items, such as 'the employees have knowledge in answering your enquiries') and (5) empathy (consisting of six items, such as 'the employees are helpful, friendly, and respectful').

Respondents were asked to rate the importance, expectation and perception of the hotel services with respect to the 39 service quality items using a five-point Likert scale. In addition, the Kano questionnaire was used to rate the service attribute performance. Regarding the Kano questionnaire, in each of the service attributes, a pair of questions was formulated to which the customer should answer in one of five different ways. The first question deals with the response of the customer due to the availability of services, whereas the second one concerns his/her reaction due to the absence of services (see Figure 4 for an example of evaluation process). In other words, those questions should refer to the provision/non- provision of the benefits to be expected through the provision of an attribute (Mikulić and Prebežac 2011). The questions utilised the 39 service quality items as the representative of the voice of the customer (Sauerwein *et al*. 1996). After having combined all

| Visualisation (negative) | Kansei word | Visualisation (positive) |
|---|---|---|
| | Unwelcome ..... Welcome | |
| | Unhappy ..... Happy | |
| | Diffident ..... Confident | |
| | Tensed ..... Relaxed | |
| | Unpeaceful ..... Peaceful | |
| | Unsatisfied ..... Satisfied | |
| | Inelegant ..... Elegant | |
| | Unfriendly ..... Friendly | |
| | Worried ..... Relieved | |
| | Passionless ..... Passionate | |
| | Noisy ..... Quiet | |

Figure 3. Emoticons used and attached in survey paper.

answers from the participants to each functional and dysfunctional question, the results of each service attribute were listed. Thereafter, the evaluation and interpretation of each Kano category was done by using a frequency analysis (Sauerwein *et al.* 1996). An example of the requirement categories of the individual service attributes and their descriptive statistics are shown in Tables 4 and 5, respectively.

This study showed that customers have high expectation where all service quality items received mean score above 4 (see the 'expectation' column in Table 5). The highest mean score was 4.54 for two items, i.e. 'the hotel's interior and exterior are well managed and maintained', and 'the atmosphere of restaurant is inviting appetite'. Both are categorised in the 'tangible' dimension. As for customer perception,

the highest mean score was 3.64 (i.e. 'all size of servings are given correctly the first time'), and the lowest one was 3.28 (i.e. 'the employees tell you exactly when services will be performed', and 'the employees are never too busy to respond to your request'). The findings also showed that customers had low perception on the 'responsiveness' dimension. Overall, their expectation was greater than perception.

Afterwards, the Kano categorisation was applied. Thirteen out of 39 items were of the attractive/exciter category, such as 'the hotel's lobby is comfortable', 'the bill is charged accurately', etc. Three items were categorised as attractive quality (A) within the 'reliability' dimension. They discussed and shared a common issue, i.e. correctness and sureness. Since most tourists were on vacation (please refer to

Table 3. Descriptive statistics of Kansei word.

| Kansei word | Importance | | | | Response | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean ($\bar{x}$) | Standard deviation (s) | Min | Max | Mean ($\bar{x}$) | Standard deviation (s) | Min | Max |
| $K_1$. convenience | 4.12 | 0.56 | 3 | 5 | 2.98 | 1.17 | 1 | 5 |
| $K_2$. attractiveness | 4.20 | 0.83 | 3 | 5 | 2.92 | 1.43 | 1 | 5 |
| $K_3$. cleanliness | 4.24 | 0.85 | 3 | 5 | 2.86 | 1.40 | 1 | 5 |
| $K_4$. welcomeness | 4.18 | 0.83 | 3 | 5 | 3.06 | 1.33 | 1 | 5 |
| $K_5$. confidence | 4.10 | 0.55 | 3 | 5 | 2.85 | 1.19 | 1 | 5 |
| $K_6$. happiness | 4.11 | 0.47 | 3 | 5 | 2.94 | 1.13 | 1 | 5 |
| $K_7$. relaxedness | 4.28 | 0.73 | 3 | 5 | 2.78 | 1.37 | 1 | 5 |
| $K_8$. peacefulness | 4.18 | 0.83 | 3 | 5 | 2.60 | 1.43 | 1 | 5 |
| $K_9$. satisfaction | 4.18 | 0.83 | 3 | 5 | 2.94 | 1.30 | 1 | 5 |
| $K_{10}$. spaciousness | 4.16 | 0.77 | 3 | 5 | 2.92 | 1.32 | 1 | 5 |
| $K_{11}$. elegance | 4.04 | 0.75 | 3 | 5 | 2.98 | 1.30 | 1 | 5 |
| $K_{12}$. friendliness | 4.36 | 0.80 | 3 | 5 | 2.76 | 1.39 | 1 | 5 |
| $K_{13}$. modernisation | 4.16 | 0.77 | 3 | 5 | 2.86 | 1.13 | 1 | 5 |
| $K_{14}$. relief | 4.28 | 0.76 | 3 | 5 | 2.94 | 1.25 | 1 | 5 |
| $K_{16}$. quietness | 4.10 | 0.79 | 3 | 5 | 2.86 | 1.39 | 1 | 5 |
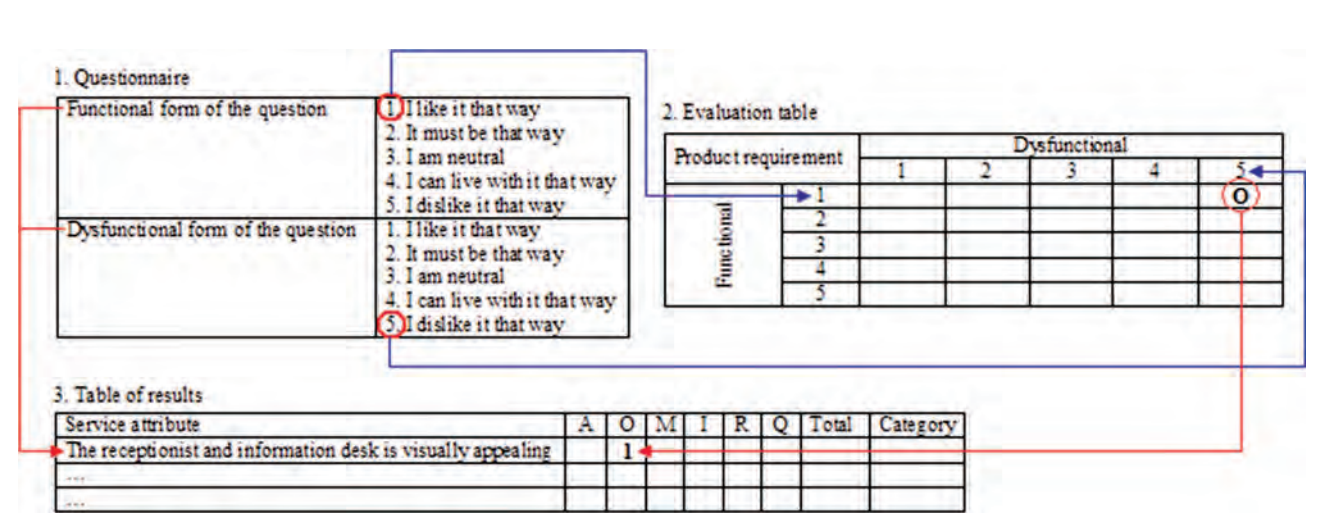


Figure 4. Kano evaluation process.

Table 4. An overview of the requirement categories of the individual service attributes.

| Service attribute | A | O | M | I | R | Q | Total | Category |
|---|---|---|---|---|---|---|---|---|
| The receptionist and information desk is visually appealing | 23 | **39** | 18 | 20 | 0 | 0 | 100 | O |
| The hotel has modern-looking equipment | 22 | 25 | **27** | 26 | 0 | 0 | 100 | M |
| The employees are never too busy to respond to your requests | **51** | 10 | 4 | 35 | 0 | 0 | 100 | A |
| ... | | | | | | | | |

Note: Bold values signify the highest frequencies that determine the Kano categories.

Table 2), it was naturally understood that they expected a secure place and its surroundings, and a related certainty. Surely, it would provide them great surprise, positive impression and sense of complete delight. According to Herzberg (1968), this condition is discussed in one of his principles related to responsibility and recognition motivator, i.e. increasing the accountability of individuals for their own work. It shows that employee accountability has a positive impact on customer emotional satisfaction. Through a gap analysis, the three attractive service attributes as mentioned above had relatively low service gaps as compared to the average gap score ($-0.87$) shown in Table 5. It means that they had relatively positive evaluation feedback on those three items which positively correlated with emotions

Table 5. Descriptive statistics of service quality incorporated with Kano category.

| Service attribute | Means ($\bar{x}$) | | | | Kano category** |
|---|---|---|---|---|---|
| | Importance | Expectation | Perception | Gap* | |
| *Tangible* | | | | | |
| A1.The receptionist and information desk is visually appealing | 4.23 | 4.38 | 3.42 | −0.96 | O |
| A2.The employees' uniforms are clean, nice, and neat | 3.96 | 4.52 | 3.40 | −1.12 | O |
| A3.The hotel has modern-looking equipment | 3.96 | 4.46 | 3.40 | −1.06 | M |
| A4.The hotel's interior and exterior are well managed and maintained | 3.94 | 4.54 | 3.52 | −1.02 | I |
| A5.The outdoor environment is visually clean | 4.13 | 4.46 | 3.44 | −1.02 | O |
| A6.The atmosphere of restaurant is inviting appetite | 4.08 | 4.54 | 3.42 | −1.12 | I |
| A7.The shops are attractive | 4.06 | 4.44 | 3.36 | −1.08 | A |
| A8.The hotel's lobby is comfortable | 4.17 | 4.22 | 3.32 | −0.90 | A |
| A9.The bedroom and bathroom are clean and convenient | 4.04 | 4.20 | 3.44 | −0.76 | M |
| A10.The hotel is well lighted | 4.06 | 4.20 | 3.48 | −0.72 | I |
| A11.The sports facilities are well maintained, clean, and convenient | 3.94 | 4.26 | 3.36 | −0.90 | M |
| A12.The music in hotel's lobby is soft and nice | 4.09 | 4.14 | 3.34 | −0.80 | M |
| A13.The scent in hotel's room and lobby is refreshing | 3.89 | 4.30 | 3.52 | −0.78 | A |
| A14.The meals served at the hotel are delicious | 4.13 | 4.18 | 3.50 | −0.68 | I |
| *Reliability* | | | | | |
| B1.Your hotel reservation is handled efficiently and effectively | 4.04 | 4.34 | 3.32 | −1.02 | M |
| B2.Your booked guestroom is ready as promised | 4.06 | 4.26 | 3.44 | −0.82 | O |
| B3.The bill is charged accurately | 4.08 | 4.16 | 3.62 | −0.54 | A |
| B4.All size of servings are given correctly the first time | 3.89 | 4.12 | 3.64 | −0.48 | A |
| B5.The employees show a sincere interest in solving your problem | 4.23 | 4.40 | 3.42 | −0.98 | A |
| B6.The hotel insists on error-free records | 4.09 | 4.28 | 3.30 | −0.98 | I |
| B7.AC, TV, radio, lights, mini bar, & other equipment work properly | 3.96 | 4.14 | 3.42 | −0.72 | O |
| B8.Overall, you got what you paid for | 4.08 | 4.40 | 3.42 | −0.98 | M |
| *Responsiveness* | | | | | |
| C1.The employees tell you exactly when services will be performed | 4.09 | 4.26 | 3.28 | −0.98 | I |
| C2.The employees give you prompt service | 3.87 | 4.22 | 3.34 | −0.88 | M |
| C3.The employees are always willing to help you | 4.06 | 4.30 | 3.44 | −0.86 | A |
| C4.The employees are never too busy to respond to your requests | 4.08 | 4.32 | 3.28 | −1.04 | A |
| C5.Informative literature about the hotel facilities is provided | 4.09 | 4.32 | 3.38 | −0.94 | A |
| *Assurance* | | | | | |
| D1.The employees have knowledge in answering your enquiries | 4.13 | 4.18 | 3.40 | −0.78 | O |
| D2.The behavior of employees instills confidence in you | 3.92 | 4.20 | 3.48 | −0.72 | I |
| D3.The employees know well about local places of interest | 4.15 | 4.26 | 3.36 | −0.90 | A |
| D4.The hotel provides a safe environment | 4.13 | 4.32 | 3.42 | −0.90 | O |
| D5.The employees are consistently courteous with you | 4.17 | 4.30 | 3.38 | −0.92 | M |
| D6.The staff explains clearly charges on your account | 3.89 | 4.20 | 3.56 | −0.64 | O |
| *Empathy* | | | | | |
| E1.The employees are helpful, friendly, and respectful | 4.21 | 4.36 | 3.44 | −0.92 | M |
| E2.The hotel gives you individual full attention | 3.96 | 4.28 | 3.44 | −0.84 | A |
| E3.The hotel has employees who give you personal attention | 4.23 | 4.20 | 3.32 | −0.88 | A |
| E4.The employees understand your specific needs | 3.81 | 4.38 | 3.52 | −0.86 | I |
| E5.The hotel has your best interests at heart | 4.04 | 4.24 | 3.60 | −0.64 | O |
| E6.The hotel has operating hours convenient to you | 4.11 | 4.16 | 3.36 | −0.80 | A |
| *Grand mean* | | 4.29 | 3.42 | −0.87 | |

Notes: *Gap = perception − expectation; **O, one-dimensional; A, attractive; M, must-be; I, indifferent.

(Hartono and Tan 2010). Hence, most of the items in the 'reliability' dimension were categorised as delighters.

### 4.6. Instrument validation

Reliability and validity tests of a measurement instrument are needed to ascertain the quality of a

survey. Initially, potential subjects were approached and explained about the purpose of the study. After that, the questions and survey procedures (including survey duration) were explained. If they were comfortable and convinced enough, survey began. Otherwise, it was cancelled. This is the face validity test which influences the motivation of the subjects participating in a study (Sanders and McCormick 1993). The question items (service attributes) were designed based on the relevant theories and significant research findings proposed by previous scholars. They include the SERVQUAL 22-item scale by Parasuraman *et al.* (1988) and the 26-item scale of hotel service quality by Ladhari (2009). These were previously empirically tested by scientific research techniques and have shown good tolerable validity. It explains that an acceptable content validity has been showed in this study and is helpful to common sense interpretation of the scale scores (Malhotra 2007, Lai and Wu 2011).

To assess construct validity, the proposed properties of the constructs in this study were tested using confirmatory factor analysis (CFA, using AMOS$^{TM}$ version16). This technique is utilised to verify the factor structure of a set of observed measures and to test the hypothesis that a relationship between observed variables and their principal latent constructs exists (Suhr 2006). In other words, it is used to confirm relationships among observed and latent measures which move beyond regression. According to Fabrigar *et al.* (1999), simulation studies show that samples as small as 100 can provide stable factor models. To address the validity of the measurement model, this study used several model fit indices, such as goodness-of-fit index (GFI), root mean square error of approximation (RMSEA) with a 90% confidence interval (CI), chi-square test, Tucker-Lewis Index (TLI) and a comparative fit index (CFI). The threshold values for each of model indices are as follows. GFI of at least 0.9 is deemed to be the standard adopted by many scholars. It, however, has been criticised that less restrictive value may be appropriate, depending on the specific area of inquiry (Firat *et al.* 2009). RMSEA with a value of 0.06 or less is acceptable (Hu and Bentler 1999). According to Browne and Cudeck (1993), its values around 0.08 indicate moderate fit, and values above 0.1 seem to be poor fit. Related to chi-square test, the fit is best if the chi-square test is statistically insignificant. TLI and CFI values of 0.9 or greater indicate acceptable model fit (Hu and Bentler 1999). To obtain a reasonably good fit, therefore, it is recommended to report not only chi-square but also RMSEA, GFI, TLI and CFI.

Regarding validity test, Kansei-service quality model revealed acceptable or near acceptable model fit in some criteria. The CFA revealed an adequate fit of the model to the current data based only on the RMSEA (0.054 with CI = 0.004–0.104), and closed to an adequate fit based on the GFI (0.807). However, there was a poor fit based on chi-square (121.52 with *p*-value = 0.005), TLI (0.767) and CFI (0.785). An effort to improve the model (i.e. check individual item properties) was undertaken. Inspection of the individual items indicated that several items did not appear to have sufficient relationship with the hypothesised factor/latent variable, according to their factor loadings. Thus, this model was modified. For instances, we added a new latent variable for 'affective process' construct. In total, there were two latent variables (factors) formed in 'affective process' construct, i.e. (i) servicescape-Kansei and (ii) interaction-Kansei. Servicescape-Kansei connected to items 'modernization', 'elegance', 'relaxedness', 'attractiveness', 'cleanliness', 'spaciousness', 'quietness', 'happiness', 'satisfaction'; whereas the remaining items connected to interaction-Kansei. In addition, item 'passionate' was removed due to very low loadings. Another modification was to split 'tangible' variable into two latent variables (factors): (i) atmospherebased-tangible and (ii) roombased-tangible. Roombased-tangible connected to four items, i.e. 'the bedroom and bathroom are clean and convenient', 'the scent in hotel's room and lobby is refreshing', 'the shops are attractive', and 'the sports facilities are well maintained, clean, and convenient'; whereas the remaining items connected to atmospherebased-tangible. Please refer to Table 6 for details of factor structure.

A final test after modifying and improving the overall model was done. The results indicated that the overall model improved; the RMSEA improved to 0.034 (with CI = 0.024–0.044), the GFI improved to 0.925, the chi-square improved to 15.125 (*p*-value = 0.088) and the TLI and CFI improved to 0.901 and 0.941, respectively. Thus, this model had a reasonably good fit.

Apart from validity test, reliability test was conducted to evaluate the internal consistency of a construct/latent variable. This study used Cronbach's alpha to test the construct reliability. It measures how well a set of items (or variables) measures a single one-dimensional latent construct. Nunnally (1978) suggests 0.7 as a benchmark for 'modest' reliability, while Churchill (1979) suggests that a Cronbach's alpha value of 0.6 is acceptable. Reliability analyses indicated adequate scores for all factors (Cronbach's alpha coefficients were: servicescape-Kansei = 0.897, interaction-Kansei = 0.873, atmospherebased-tangible = 0.905, roombased-tangible = 0.841, reliability = 0.881, responsiveness = 0.823, assurance = 0.851 and empathy = 0.843). Thus, this

Table 6. Factor structure.

| Latent construct | Factor | Number of loaded items | Item code* (factor loading) | Cronbach's alpha |
|---|---|---|---|---|
| Affective process | Servicescape-Kansei | 9 | $K_2$ (0.629), $K_3$ (0.741), $K_6$ (0.643), $K_7$ (0.822), $K_9$ (0.688), $K_{10}$ (0.732), $K_{11}$ (0.805), $K_{13}$ (0.761), $K_{16}$ (0.765) | 0.897 |
| | Interaction-Kansei | 6 | $K_1$ (0.716), $K_4$ (0.798), $K_5$ (0.735), $K_8$ (0.849), $K1_2$ (0.804), $K_{14}$ (0.799) | 0.873 |
| Service quality | Atmospherebased-tangible | 10 | $A_1$ (0.841), $A_2$ (0.716), $A_3$ (0.685), $A_4$ (0.749), $A_5$ (0.698), $A_6$ (0.703), $A_8$ (0.777), $A_{10}$ (0.759), $A_{12}$ (0.709), $A_{14}$ (0.722) | 0.905 |
| | Roombased-tangible | 4 | $A_7$ (0.773), $A_9$ (0.859), $A_{11}$ (0.781), $A_{13}$ (0.882) | 0.841 |
| | Reliability | 8 | $B_1$ (0.674), $B_2$ (0.777), $B_3$ (0.749), $B_4$ (0.687), $B_5$ (0.738), $B_6$ (0.774), $B_7$ (0.757), $B_8$ (0.760) | 0.881 |
| | Responsiveness | 5 | $C_1$ (0.785), $C_2$ (0.727), $C_3$ (0.764), $C_4$ (0.782), $C_5$ (0.774) | 0.823 |
| | Assurance | 6 | $D_1$ (0.789), $D_2$ (0.695), $D_3$ (0.779), $D_4$ (0.812), $D_5$ (0.797), $D_6$ (0.681) | 0.851 |
| | Empathy | 6 | $E_1$ (0.746), $E_2$ (0.787), $E_3$ (0.800), $E_4$ (0.745), $E_5$ (0.767), $E_6$ (0.658) | 0.843 |

Note: *Please refer to Tables 3 and 5 for details of item name.

model also demonstrated adequate reliability. Table 6 shows all findings of factor structure, including the number and names of factors, loaded items of each factor, factor loading of each item and Cronbach's alpha of each factor. Regarding factor loading of each item, Hulland (1999) argued that, in general terms, items with loadings of less than 0.5 should be dropped. According to Chin (1998), where scales are adapted from other settings and some are new scales, a loading of 0.5 can be used as a cut-off point. In this study, all individual items showed adequate factor loadings.

### 4.7. Model fitting: link and evaluation

The perceived service quality and Kansei responses were met, linked and analysed by using stepwise linear regression (Efroymson 1960). This method had an automatic procedure in cases where there was a large number of potential independent/explanatory variables (for example, there were 39 service attributes in this study), and no underlying theory on which to base the model selection. Basically, at each iteration process, after a new independent variable is added in the model, a test will be made to check whether other variables can be deleted without increasing the residual sum of squares (RSS). This process is terminated when the measure is locally maximised (Efroymson 1960).

In each model, the five-point Likert based scores given by respondents to each Kansei word (i.e. Kansei response scores) and perceived service attribute were used as dependent and independent variables, respectively. The data were then analysed using SPSS® 13 for Windows. The statistical output is presented in Table 7. The most significant model was for the Kansei word 'peacefulness' ($p$-value $< 0.001$, $R^2 = 0.531$). Five service attributes had statistical influence on the Kansei word 'peacefulness', including 'the bill is charged accurately', 'the employees' uniforms are clean, nice, and neat', 'the employees show a sincere interest in solving your problem', 'the hotel gives you individual full attention' and 'the scent in hotel's room and lobby is refreshing'. By observing the model coefficients, it is concluded that the service attribute 'the employees' uniforms are clean, nice and neat' (coefficient = 0.893) had a slightly greater effect on the Kansei word 'peacefulness' in comparison with the other Kansei words.

### 4.8. Analysis of action

This refers to the reverse of the significant models, to see the extent to which service attribute influences particular emotions/Kansei. By referring to the significant models as provided in Table 7, the reversed models are shown in Table 8.

By engaging the attractive service attributes (A) only and taking into account the service gap, the next step was to decide an action whether to proceed with continuous improvement or with enhancement/maintenance. As shown in Table 8, there were nine attractive service attributes (A) having the significant relationship with several Kansei words (shown in grey background). They were related to the 'tangible' dimension ('the scent in hotel's room and lobby is refreshing'), the 'reliability' dimension ('the bill is charged accurately', 'all size of servings are given correctly the first time', and 'the employees show a sincere interest in solving your problem'), the

Table 7. Significant regression model for each Kansei word.

| Kansei word | $p$-value | $R^2$ | Significant model (with $\alpha = 5\%$) | Description of service attributes affected |
|---|---|---|---|---|
| Convenience | 0.013 | 0.122 | Convenience $= 0.971 + 0492C_4$ | The employees are never too busy to respond your requests ($C_4$) |
| Attractiveness | <0.001 | 0.420 | Attractiveness $= 3.286 + 0.76C_4 - 0.941C_3 + 0.712B_4 - 0.575A_{14}$ | The employees are never too busy to respond your requests ($C_4$)<br>The employees are always willing to help you ($C_3$)<br>All size of servings are given correctly the first time ($B_4$)<br>The meal served at the hotel are delicious ($A_{14}$) |
| Cleanliness | 0.001 | 0.248 | Cleanliness $= -1.557 + 0.576A_{13} + 0.545B_3$ | The scent in hotel's room and lobby is refreshing ($A_{13}$)<br>The bill is charged accurately ($B_3$) |
| Welcomeness | 0.02 | 0.108 | Welcomeness $= 0.909 + 0.527C_4$ | The employees are never too busy to respond your requests ($C_4$) |
| Confidence | 0.024 | 0.102 | Confidence $= 0.904 + 0.47D_4$ | The hotel provides a safe environment ($D_4$) |
| Happiness | 0.001 | 0.243 | Happiness $= -1.394 + 0.624B_3 + 0.432E_3$ | The bill is charged accurately ($B_3$)<br>The hotel has employees who give you personal attention ($E_3$) |
| Relaxedness | 0.032 | 0.092 | Relaxedness $= 0.641 + 0.517D_4$ | The hotel provides a safe environment ($D_4$) |
| Peacefulness | <0.001 | 0.531 | Peacefulness $= -5.595 + 0.514B_3 + 0.893A_2 + 0.705B_5 - 0.46E_2 + 0.353$ | The bill is charged accurately ($B_3$)<br>The employees' uniforms are clean, nice, and neat ($A_2$)<br>The employees show a sincere interest in solving your problem ($B_5$)<br>The hotel gives you individual full attention ($E_2$)<br>The scent in hotel's room and lobby is refreshing ($A_{13}$) |
| Satisfaction | <0.001 | 0.320 | Satisfaction $= 1.174 + 0.583B_3 - 0.496A_{14} + 0.362C_5$ | The bill is charged accurately ($B_3$)<br>The meals served at the hotel are delicious ($A_{14}$)<br>Informative literature about the hotel facilities is provided ($C_5$) |
| Spaciousness | 0.002 | 0.232 | Spaciousness $= -1.379 + 0.559D_4 + 0.487C_4$ | The hotel provides a safe environment ($D_4$)<br>The employees are never too busy to respond your requests ($C_4$) |
| Elegance | 0.038 | 0.086 | Elegance $= 1.022 + 0.473D_4$ | The hotel provides a safe environment ($D_4$) |
| Friendliness | 0.001 | 0.259 | Friendliness $= 1.634 + 0.709C_4 - 0.426A_{14}$ | The employees are never too busy to respond your requests ($C_4$)<br>The meal served at the hotel are delicious ($A_{14}$) |
| Modernisation | 0.001 | 0.292 | Modernisation $= 0.375 + 0.517B_5 + 0.5B_6 - 0.431B_8$ | The employees show a sincere interest in solving your problem ($B_5$)<br>The hotel insists on error-free records ($B_6$)<br>Overall, you got what you paid for ($B_8$) |
| Relief | 0.007 | 0.143 | Relief $= 0.609 + 0.571C_4$ | The employees are never too busy to respond your requests ($C_4$) |
| Quietness | 0.004 | 0.209 | Quietness $= -2.257 + 0.639B_3 + 0.606E_3$ | The bill is charged accurately ($B_3$)<br>The hotel has employees who give you personal attention ($E_3$) |

'responsiveness' dimension ('the employees are always willing to help you', 'the employees are never too busy to respond to your requests', and 'Informative literature about the hotel facilities is provided') and the 'empathy' dimension ('the hotel gives you individual full attention', and 'the hotel has employees who give you personal attention'). There was no significant item related to the 'assurance' dimension.

Since all service gaps were negative, the action was directed to the prioritised continuous improvement. The attribute 'the employees are never too busy to respond to your requests' was considered to be the first priority for improvement. It had the greatest influence on emotion, since it was significantly related to the largest number of Kansei words (i.e. seven Kansei words). They include 'convenience', 'attractiveness', 'welcomeness', 'passion', 'spaciousness', 'friendliness' and 'relief'. The other results of the prioritisation for continuous improvement are shown in Table 8.

## 5. Discussion and implications

During service encounters, customers experience both the physical (servicescape) and the non-physical parts of services. Their individual perception serves as a cognitive process which stimulates their emotional

Table 8. The significant relationship between service attribute and Kansei word along with prioritised continuous improvement.

| Service attribute and its Kano category | Related significant Kansei word* | Gap** | Prioritisation for continuous improvement |
|---|---|---|---|
| *Tangible* | | | |
| The employees' uniforms are clean, nice, and neat (One-dimensional) | Peaceful | −1.12 | – |
| The scent in hotel's room and lobby is refreshing (Attractive) | Cleanliness, peacefulness | −0.78 | 5 |
| The meals served at the hotel are delicious (Indifferent) | *Attractiveness, satisfaction, friendliness* | −0.68 | – |
| *Reliability* | | | |
| The bill is charged accurately (Attractive) | Cleanliness, happiness, peacefulness, satisfaction, quietness | −0.54 | 2 |
| All size of servings are given correctly the first time (Attractive) | Attractiveness | −0.48 | 7 |
| The employees show a sincere interest in solving your problem (Attractive) | Peacefulness, modernisation | −0.98 | 3 |
| The hotel insists on error-free records (Indifferent) | Relief | −0.98 | – |
| Overall, you got what you paid for (Must-be) | *Modernisation* | −0.98 | – |
| *Responsiveness* | | | |
| The employees are always willing to help you (Attractive) | *Attractiveness* | −0.86 | – |
| The employees are never too busy to respond to your requests (Attractive) | Convenience, attractiveness, welcomeness, spaciousness, friendliness, relief | −1.04 | 1 |
| Informative literature about the hotel facilities is provided (Attractive) | Satisfaction | −0.94 | 6 |
| *Assurance* | | | |
| The hotel provides a safe environment (One-dimensional) | Confidence, relaxedness, spaciousness, elegance | −0.90 | – |
| *Empathy* | | | |
| The hotel gives you individual full attention (Attractive) | *Peacefulness* | −0.84 | – |
| The hotel has employees who give you personal attention (Attractive) | Happiness, quietness | −0.88 | 4 |

Notes: *Kansei words with italic texts have significant negative relationship with service attributes; **Gap = perception – expectation; Service attributes in grey background signify 'attractive' (A) category.

response (affective process). It has been empirically proven that cognition has a very significant correlation with affection (Hartono and Tan 2010). Cognitive processing may relate to form pre-consumption expectancies, observe perceived performance of product or service attributes, compare performance with expectations, form disconfirmation perceptions and form satisfaction judgments (Oliver 1980, 1993, Tse and Wilton 1988). Affective processing, however, may refer to the emotional response given by the customers due to product interaction or service encounter. It implies that all processes within the span of the service attributes space form cognitive processing, whereas those that are within the span of the semantic space form affective processing.

The Kano model helps to identify different categories of service attribute quality. The attractive (A) category is of interest to fulfil customer emotional needs/Kansei and to maximise customer overall satisfaction. This is the service quality category which is neither taken for granted nor expressed by customers. Consequently, service attributes of the attractive category (A) were chosen to be the main focus for modelling and analysis in this study. The other two common categories (i.e. one-dimensional (O) and must-be (M)) were considered as primary features to be satisfied on a regular basis. According to Maslow (1943), one-dimensional and must-be qualities are positioned below the self-actualisation level. They are mostly covered in the hygiene factors (Herzberg 1968). Yang (2011) argued that those qualities were less sensitive and satisfaction-driving attributes. As a consequence, they are unlikely to be associated with strong emotions such as delight. Thus, they are deemed to be compulsory qualities to be well performed on a daily basis.

An integrative framework of the Kano model and KE has been proposed and tested through an empirical study on luxury hotel services. This study postulated that the perceived service attributes/qualities impacted on emotions/Kansei response. This proposition was significantly supported. By using stepwise linear regression, emotions/Kansei words elicited and impacted by particular perceived service attributes were investigated, modelled and evaluated. It explains that a certain Kansei word has been significantly influenced by one or more service attributes. In other words, a service attribute might have impact on one or more Kansei words. The more the Kansei words were significantly influenced, the more important the services attribute was.

As a practical implication, this study gives a useful insight to service designers. It helps them identify what efforts in terms of continuous improvement or enhancement/maintenance should be directed towards the attractive attributes (A) which have significant impact on Kansei words. According to research findings, the attribute 'the employees are never too busy to respond to your requests' should be given the first priority for continuous improvement. Intensive regular training in topics such as character building, leaderships, communication skills and focus on customers for staffs are encouraged. In addition, the hotel management should assure sufficient number of staffs equipped with their relevant knowledge and professionalism. In order to be customer conscious, a campaign slogan (such as 'always there for customer') might be useful for daily awareness by all hotel staff.

Totally, there were seven prioritised service attributes to be taken care of by the hotel service providers as shown in Table 8 (in grey background). Two service attributes were neglected for prioritisation of improvement (i.e. 'the employees are always willing to help you' and 'the hotel gives you individual full attention'), since they had negative relationships with particular Kansei words.

## 6. Conclusion and further research

The trend of the 21st century is towards hedonism and pleasure. Delighting customers is an essential key for achieving customer retention and total emotional satisfaction. It requires positive surprise of customers beyond their expectation. KE has shown its ability to deal with customer emotional needs. This method is able to capture and translate those emotional needs, and to build a mathematical model that represents the relationships between emotion and product elements/service attributes. Traditional KE methodology has been applied intensively and successfully in product design and development. As quality control has been introduced in the service industry, it is a great opportunity to apply KE to services. This newly KE applied to hospitality services is called Kansei Quality Management (KQM) (Nagamachi and Lokman 2011).

As reviewed, recent research in KE lacks a relationship between product/service performance and customer emotional needs/Kansei. This study presented and discussed the integrative framework of the Kano model and KE. It promoted the Kano model incorporated into the systematic KE methodology with a focus on attractive/delighting/exciting quality of service attributes. The Kano categorisation of service attributes incorporated into the proposed framework offers competitive benefits in terms of prioritised improvement and efficiency. An attractive attribute was found to have the greatest influence on customer Kansei. In addition, it was the first step of prioritisation of service quality improvement with regard to limited resources (e.g. budget, time, workforce and other technical reasons). Since the domain of study was luxury hotels which potentially give more impact on customer emotional feelings, appropriate strategies should be applied to win the business competition. They include how to always stand out and focus on attractive requirements, and fulfil all basic/must-be and proportional/one-dimensional requirements on a regular basis.

Essentially, KQM focuses on something beyond usability and functionality. Thus, it fits the attractive attributes which are neither explicitly expressed nor expected by customers. The business strategy should be directed to delight or excite customers immediately. In other words, the focus for business improvement should be on customer loyalty and total satisfaction, rather than on minimising dissatisfaction.

This study provides a theoretical contribution to the academic literature on Kansei ergonomics, service science and quality management by proposing an integrated conceptual framework and methodology of KE and the Kano model. In addition, a practical contribution is presented by giving a guideline for service managers in investigating which service attributes are significantly sensitive to customer delights and given a priority for improvement or maintenance. Its practical potential benefit and impact can be large as service is the fastest growing sector in today's businesses.

Since this study is relatively new in nature and of limited data, the findings obtained may not be generalised for all service industries. Some future work on the integration of the Kano model and KE are still of interest in addressing, for example, the following issues:

- Collect more data with regard to different cultural backgrounds of respondent. It seemed that research findings might be influenced by the customer cultural background. This study was done by looking at Indonesian tourist perspectives only. Future research should test the significance of proposed integrative framework on other groups of tourist.
- Apply this integrative framework to access and to evaluate the relationship of customer emotional needs/Kansei and perceived service attributes in other service industries or domains.
- Extend the framework of the Kano model and KE into a systematic framework for improvement. It is possible to incorporate this framework into QFD.
- Investigate the implication of this integrative framework with other interaction with customer (e.g. effects on customer behavioural intention/ customer loyalty).

### References

Barsky, J. and Nash, L., 2002. Evoking emotion: affective keys to hotel loyalty. *Cornell Hotel and Restaurant Administration Quarterly*, 43, 39–46.

Berger, C., *et al.*, 1993. Kano's methods for understanding customer-defined quality. *Center for Quality of Management Journal*, 4, 3–36.

Bitner, M.J., 1992. Servicescapes: the impact of physical surroundings on customers and employees. *Journal of Marketing*, 56, 57–71.

Browne, M.W. and Cudeck, R., 1993. Alternative ways of assessing model fit. *In*: K.A. Bollen and J.S. Long, eds. *Testing structural equation models*. Newbury Park, CA: Sage, 136–162.

Chen, C.-C. and Chuang, M.-C., 2008. Integrating the Kano model into a robust design approach to enhance customer satisfaction with product design. *International Journal of Production Economics*, 114, 667–681.

Chin, W.W., 1998. The partial least squares approach to structural equation modeling. *In*: G.A. Marcoulides, ed. *Modern methods for business research*. Mahwah, NJ: Erlbaum, 295–336.

Churchill, G., 1979. A paradigm for developing better measures for marketing constructs. *Journal of Marketing Research*, 16 (1), 64–73.

Collins, J. and Porras, J., 2004. *Built to last: successful habits of visionary companies*. New York: Harper Collins Publishers.

Derbaix, C.M., 1995. The impact of affective reactions on attitudes toward the advertisement and the brand: a step toward ecological validity. *Journal of Marketing Research*, 32, 470–479.

Desmet, P.M.A., 2003. Measuring emotions: development and application of an instrument to measure emotional responses to products. *In*: M.A. Blythe, A.F. Monk, K. Overbeeke, and P.C. Wright, eds. *Funology: from usability to enjoyment*. Dordrecht: Kluwers Academic Publisher, 111–123.

Desmet, P.M.A., 2008. Product emotion. *In*: H.N.J. Schifferstein and P. Hekkert, eds. *Product experience*. Oxford: Elsevier Ltd., 379–397.

Dube, L., Cervellon, M.-C., and Jingyuan, H., 2003. Should consumer attitudes be reduced to their affective and cognitive bases? Validation of a hierarchical model. *International Journal of Research in Marketing*, 20, 259–272.

Efroymson, M.A., 1960. Multiple regression analysis. *In*: A. Ralston and H.S. Wilf, eds. *Mathematical methods for digital computers*. New York: Wiley, 191–203.

Fabrigar, L.R., *et al.*, 1999. Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4, 272–299.

Firat, M.Z., *et al.*, 2009. Menstrual attitude questionnaire: confirmatory and exploratory factor analysis with Turkish samples. *Journal of Advanced Nursing*, 65 (3), 652–662.

Hartono, M. and Tan, K.C., 2010. The role of Kansei engineering in influencing overall satisfaction and behavioral intention in service encounters. *In*: *Proceedings of the 1st southeast Asian network of ergonomics societies (SEANES) conference*, 14–17 December 2010, Cebu City, Philippines. Manila: Philippine Ergonomics Society, 16–28.

Helander, M.G., 2003. Hedonomics-affective human factors design. *Ergonomics*, 46, 1269–1272.

Herzberg, F., 1968. One more time: how do you motivate employees? *Harvard Business Review*, 46 (1), 53–62.

Hu, L. and Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.

Huang, A.H., Yen, D.C., and Zhang, X., 2008. Exploring the potential effects of emoticons. *Information & Management*, 45, 466–473.

Hulland, J., 1999. Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal*, 20, 195–204.

Kano, K.H., *et al.*, 1984. How to delight your customers. *Journal of Product & Brand Management*, 5, 6–17.

Ladhari, R., 2009. Service quality, emotional satisfaction, and behavioral intentions: a study in the hotel industry. *Managing Service Quality*, 19 (3), 308–331.

Lai, H.-J. and Wu, H.-H., 2011. A case study of applying Kano's model and Anova technique in evaluating service quality. *Information Technology Journal*, 10 (1), 89–97.

Lanzotti, A. and Tarantino, P., 2008. Kansei engineering approach for total quality design and continuous innovation. *The TQM Journal*, 20, 324–337.

Laros, F.J.M. and Steenkamp, J.-B.E.M., 2005. Emotions in consumer behavior: a hierarchical approach. *Journal of Business Research*, 58, 1437–1445.

Lee, Y.-H. and Chen, T.-L., 2006. A Kano two-dimensional quality model in Taiwan's hot spring hotels service quality evaluations. *Journal of American Academy of Business*, 8 (2), 301–306.

Lin, I.Y., 2004. Evaluating a servicescape: the effect of cognition and emotion. *International Journal of Hospitality Management*, 23, 163–178.

Llinares, C. and Page, A.F., 2011. Kano's model in Kansei Engineering to evaluate subjective real estate consumer preferences. *International Journal of Industrial Ergonomics*, 41, 233–246.

Lovelock, C.H., 1991. *Services marketing*. 2nd ed. New Jersey: Prentice-Hall, Englewood Cliffs.

Malhotra, N.K., 2007. *Marketing research: an applied orientation*. 5th ed. New Jersey: Pearson Prentice Hall.

Maslow, A.H., 1943. A theory of human motivation. *Psychological Review*, 50, 370–396.

Matzler, K. and Hinterhuber, H.H., 1998. How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment. *Technovation*, 18, 25–38.

Mikulić, J. and Prebežac, D., 2011. A critical review of techniques for classifying quality attributes in the Kano model. *Managing Service Quality*, 21 (1), 46–66.

Nagamachi, M., 1995. Kansei engineering: a new ergonomic consumer-oriented technology for product development. *International Journal of Industrial Ergonomics*, 15, 3–11.

Nagamachi, M., 2002. Kansei engineering as a powerful consumer-oriented technology for product development. *Applied Ergonomics*, 33, 289–294.

Nagamachi, M. and Imada, A.S., 1995. Kansei engineering: an ergonomic technology for product development. *International Journal of Industrial Ergonomics*, 15, 1.

Nagamachi, M., *et al.*, 2009. Kansei engineering and its application to developing new preventing bedsore mattress. *In*: *Proceedings of 17th IEA 2009 ergonomics world congress*, 9–14 August 2009, Beijing, China. Beijing: Chinese Ergonomics Society.

Nagamachi, M. and Lokman, A.M., 2011. *Innovations of Kansei engineering*. Boca Raton: CRC Press.

Nunnally, J.C., 1978. *Psychometric theory*. 2nd ed. New York: McGraw-Hill.

Oliver, R.L., 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17, 460–469.

Oliver, R.L., 1993. Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20, 418–430.

Osgood, C.E., *et al.*, 1957. *The measurement of meaning*. Illinois: University of Illinois Press.

Parasuraman, A., Berry, L.L., and Zeithaml, V.A., 1988. SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64, 12–40.

Philips, D.M. and Baumgartner, H., 2002. The role of consumption emotions in the satisfaction response. *Journal of Consumer Psychology*, 12, 243–352.

Rahardjo, H., 2007. Dealing with the Kano model dynamics: strengthening the quality function deployment as a design for six sigma tool. *Jurnal Teknik Industri*, 9, 15–26.

Sanders, M.S. and McCormick, E.J., 1993. *Human factors in engineering and design*. 7th ed. Singapore: McGraw-Hill International Editions.

Sauerwein, E., *et al.*, 1996. The Kano model: how to delight your customers. *In*: Preprints Volume I of IX., *International working seminar on production economics*, 19–23 February 1996, Innsbruck, Austria. Innsbruck: University of Innsbruck, 313–327.

Schneider, B. and Bowen, D.E., 1999. Understanding customer delight and outrage. *Sloan Management Review*, 41 (1), 35–45.

Schütte, S., 2002. *Designing feeling into products: integrating Kansei engineering methodology in product development*. Thesis (PhD). Linkopings Universitet.

Schütte, S., *et al.*, 2004. Concepts, methods and tools in Kansei engineering. *Theoretical Issues in Ergonomics Science*, 5, 214–232.

Schütte, S., *et al.*, 2008. Affective meaning: the Kansei engineering approach. *In*: H.N.J. Schifferstein and P. Hekkert, eds. *Product experience*. Oxford: Elsevier Ltd., 477–496.

Senge, P., 2006. *The fifth discipline: the art and practice of the learning organisation*. New York: Doubleday.

Shen, X.X., Tan, K.C., and Xie, M., 2000. An integrated approach to innovative product development using Kano's model and QFD. *European Journal of Innovation Management*, 3 (2), 91–99.

Shimizu, Y., *et al.*, 2004. On-demand production system of apparel on basis of Kansei engineering. *International Journal of Clothing Science and Technology*, 16, 32–42.

Steinar, K., 2007. *Doing interviews*. London: SAGE Publications.

Stephens, N. and Gwinner, K.P., 1998. Why don't some people complain? A cognitive-emotive process model of consumer complaint behavior. *Journal of the Academy of Marketing Science*, 26, 172–189.

Suhr, D.D., 2006. Exploratory or confirmatory factor analysis? *Proceedings of the 31st annual SAS conference (SUGI 31)*, 200–31.

Tan, K.C. and Pawitra, T.A., 2001. Integrating SERVQUAL and Kano's model into QFD for service excellent development. *Managing Service Quality*, 11, 418–430.

Tiger, L., 1992. *The pursuit of pleasure*. Boston: Little Brown.

Tse, D.K. and Wilton, P.C., 1988. Models of customer satisfaction formation: an extension. *Journal of Marketing Research*, 25, 204–212.

Vargo, S.L. and Lusch, R.F., 2004. The four service marketing myths-remnants of goods-based, manufacturing model. *Journal of Service Research*, 6, 324–335.

Wittel, L.N. and Fundin, A., 2005. Dynamics of service attributes: a test of Kano's theory of attractive quality. *International Journal of Service Industry Management*, 16 (2), 152–168.

Yang, C.-C., 2011. Identification of customer delight for quality attributes and its applications. *Total Quality Management & Business Excellence*, 22 (1), 83–98.

Zeelenberg, M. and Pieters, R., 1999. Comparing service delivery to what might have been. *Journal of Service Research*, 2, 86–97.